New Species of *Gaza*, *Mirachelus*, *Calliotropis*, and *Echinogurges* (Gastropoda: Trochidae) from the Northwestern Atlantic Ocean

James F. Quinn, Jr.
Florida Marine Research Institute
Department of Natural Resources
100 Eighth Avenue, SE
St. Petersburg, FL 33701-5095, USA

ABSTRACT

Five new species of Trochidae from the northwestern Atlantic Ocean are described. *Gaza olivacea*, from the northern coast of South America, is similar to *G. superba* (Dall, 1881) but differs in shell shape and characters of the outer lip and umbilical septum. *Mirachelus acanthus*, known only from Bermuda, most resembles *M. clinocnemus* Quinn, 1979, but differs in shell shape and sculpture. *Calliotropis globosa*, from off the Yucatán Peninsula, Mexico, Jamaica, and the northeastern coast of South America from Venezuela to Suriname, is most similar to *C. actinophora* (Dall, 1890) but differs in relative shell height and umbilical diameter and in sculpture. *Calliotropis dentata*, known only by the holotype from off Venezuela, is most similar to *C. persculpta* (Sowerby, 1903) from off South Africa but has a proportionately higher shell and stronger, coarser sculpture. *Echinogurges tuberculatus*, from off eastern Florida, the Straits of Florida, and the northern Bahamas, is most similar to *E. clavatus* (Watson, 1879) but is distinguished by sculptural details.

Key words: Trochidae; *Gaza*; *Mirachelus*; *Calliotropis*; *Echinogurges*; systematics; new species.

INTRODUCTION

Many undescribed species were discovered during the preparation of two geographically limited monographs of western Atlantic Trochidae (Quinn, 1979, in press a). This paper presents accounts of five new species of the subfamilies Margaritinae and Eucyclinae (following the classification of Hickman & McLean, 1990). New species of the subfamilies Solariellinae and Calliostomatinae are presented elsewhere (Quinn, 1991; in press a,b; in preparation).

Institutional abbreviations used in this paper are as follows: AMNH—American Museum of Natural History; ANSP—Academy of Natural Sciences of Philadelphia; DMNH—Delaware Museum of Natural History, Wilmington; UF—Florida Museum of Natural History, University of Florida, Gainesville; FSBC I—Florida Marine Research Institute, Department of Natural Resources, St. Petersburg; LACM—Natural History Museum of Los Angeles County, Los Angeles; MCZ—Museum of Comparative Zoology, Harvard University, Cambridge; TAMU—Texas A&M University, College Station; UMML—Rosenstiel School of Marine and Atmospheric Science, University of Miami, Miami; USNM—National Museum of Natural History, Smithsonian Institution, Washington.

SYSTEMATICS

Family Trochidae Rafinesque, 1815
Subfamily Margaritinae Stoliczka, 1868
Tribe Gazini Hickman and McLean, 1990

Genus *Gaza* Watson, 1879

Type species (monotypy): *Gaza daedala* Watson, 1879.

Gaza olivacea new species
(figures 1–3)

Gaza superba: Okutani, 1983:240.
Gaza sp.: Hickman and McLean, 1990: fig. 51A.

Description: Shell large, attaining 38.1 mm height, 44.9 mm width, broadly conical; whorl profiles weakly convex, with broadly rounded peripheries; umbilicate with umbilical septum; drab-olive to light brown, nacreous under thin outer porcelaneous layer. Protoconch usually missing. Teleoconch whorls about 6, weakly shouldered subsuturally, weakly convex with broadly rounded peripheries, smooth except for microscopic spiral striae. Base almost flat, smooth except for striae like those above. Umbilicus wide, about 25% maximum whorl diameter; wall smooth, parallel to shell axis. Aperture ovate; outer lip oblique and reflected into slightly thickened, nacreous rim, tangential to periphery of previous whorl; inner lip reflected and expanded to form nacreous septum covering umbilicus; columella weakly concave in immature specimens, sigmoid in mature specimens.

Figures 1–3. *Gaza olivacea* new species. Holotype, USNM 752369, height 32.9 mm, width 39.8 mm, from N of Cabo de la Vela, Peninsula de la Guajira, Colombia, *Oregon* Station 5690, 12°30′N, 72°08′W, 470 m.

Type material: Holotype, USNM 752369; 22 paratypes, USNM 859424; *Oregon* Station 5690, 12°30′N, 72°08′W, 470 m; 40-foot otter trawl; 10 October 1965.—17 paratypes, USNM 752390; 1 paratype, UMML 30.8365; 1 paratype, FSBC I 39513; *Oregon* Station 4301, 7°35′N, 54°13′W, 366 m; 65-foot otter trawl; 24 March 1963.

Type locality: North of Cabo de la Vela, Peninsula de la Guajira, Colombia, *Oregon* Station 5690, 12°30′N, 72°08′W, 470 m.

Other material examined: 14 specimens, USNM 752391 (+ 61 uncatalogued USNM, and duplicates in other museums); *Oregon* Station 2026, 7°10′N, 53°07′W, 366 m; 40-foot otter trawl; 9 November 1957.—15 specimens, USNM 752389 (+ 200–300 uncatalogued USNM, and duplicates in other museums); *Oregon* Station 2005, 7°34′N, 54°50′W, 366 m; 40-foot otter trawl; 6 November 1957.—1 specimen, USNM 752383; *Oregon* Station 1982, 10°00′N, 59°59′W, 457 m; 40-foot otter trawl; 3 November 1957.—8 specimens, USNM 752388; *Oregon* Station 5028, 11°30′N, 60°46′W, 366–439 m; 40-foot otter trawl; 22 September 1964.—2 specimens, USNM 752393; *Oregon* Station 5930, 15°38′N, 61°07′W, 808 m; otter trawl; 5 March 1966.—19 specimens, USNM 752384 (+ 54 uncatalogued USNM, and duplicates in other museums); *Oregon* Station 2351, 11°31′N, 62°24′W, 338–366 m; 40-foot otter trawl; 23 September 1958.—17 specimens, USNM 752377; *Oregon* Station 2780, 11°36′N, 62°52′W, 393–421 m; 40-foot otter trawl; 20 April 1960.—15 specimens, USNM 752366; *Oregon* Station 4420, 11°46′N, 69°17′W, 421 m; 40-foot otter trawl; 4 October 1963.—7 specimens, USNM 752372; *Oregon* Station 5692, 12°31′N, 71°58′W, 375 m; 40-foot otter trawl; 10 October 1965.—4 specimens, TAMU 4-1737; 2 specimens, TAMU 4-0388; *Alaminos* Station 70A10-40, 12°40′N, 72°00′W, 622–658 m; 57-foot trawl; 18 July 1970.—9 specimens, USNM 752373; *Oregon* Station 4923, 12°21′N, 72°40′W, 439–448 m; 40-foot otter trawl; 2 June 1964.—13 specimens, UMML 30.8364; *John Elliott Pillsbury* Station P-781, 11°30.1′N, 73°26.5′W, 567–531 m; 10-foot otter trawl; 30 July 1968.—16 specimens, USNM 752376; *Oregon II* Station 11252, 11°25′N, 73°56′W, 435 m; 71-foot otter trawl; 10 November 1970.—3 specimens, USNM 752374; *Oregon II* Station 11251, 11°23′N, 74°16′W, 457 m; 71-foot otter trawl; 10 November 1970.—7 specimens, USNM 752364; *Oregon II* Station 10266, 11°04′N, 74°25′W, 27 m; 71-foot otter trawl; 2 December 1968.—12 specimens, USNM 752365; *Oregon II* Station 11248, 11°18′N, 74°44′W, 600 m; 71-foot otter trawl; 9 November 1970.—9 specimens, USNM 752363 (+ 100 uncatalogued USNM, and duplicates in other museums); *Oregon II* Station 10260, 11°03′N, 75°18′W, 366 m; 71-foot otter trawl; 2 December 1970.—5 specimens, USNM 752375; *Oregon* Station 5722, 9°36′N, 76°22′W, 512 m; 65-foot otter trawl; 16 October 1965.—1 specimen, USNM 94991; *Albatross* Station 2143, 9°30′45″N, 76°25′30″W, 283 m; small beam trawl; 23 March 1884.—4 specimens, USNM 752392; *Oregon* Station 3584, 9°13′N, 81°30′W, 366 m; 40-foot otter trawl; 25 May 1962.—20 USNM lots with localities within range indicated above.

Remarks: Shells of *Gaza olivacea* are most similar to those of *Gaza superba* (Dall, 1881) but differ in being more broadly conical and in having more flattened whorl profiles and much weaker spiral striae; the outer lip is not angulate at the junction with previous whorl (figures 2, 3); and the nacreous septum covers the entire umbilicus. With the exception of the spiral striae and umbilical septum, shells of *G. olivacea* differ from those of the Galapagan *G. rathbuni* Dall, 1890, by the same characters that differentiate *G. olivacea* and *G. superba*. *Gaza olivacea* is known from Golfo de los Mosquitos, Panamá, eastward along the northern coast of South America to Suriname and French Guiana. Although the depth range for this species is 283–808 m ($\bar{x}$ = 433 m, n = 38), 87% of all collections were made in depths of 350–550 m; these analyses ignored records of 15 fms (27 m; *Oregon II* Station 10266) and 25 fms (46 m; *Oregon II* Station 11275) because they are most likely errors for 150 fms and 250 fms, respectively. These depths are shallower than those for *G. superba* (range = 360–1,006 m; $\bar{x}$ =

Figures 4–6. *Mirachelus acanthus* new species. **4.** Paratype, DMNH 187590, height 3.45 mm, width 2.95 mm, from off Bermuda. **5.** Same specimen, aperture, 27 ×. **6.** Same specimen, oblique view of protoconch and first whorl, 108 ×.

556 m, n = 78), for which 86% of all collections have been made between 440 m and 680 m (Quinn, in press a). The geographic ranges of *G. olivacea* and *G. superba* overlap slightly only in Panamá in the west, and off Grenada and Suriname in the east. A third western Atlantic species, *G. fischeri* Dall, 1889, has a geographic range that encompasses the ranges of both *G. olivacea* and *G. superba*, but occurs in depths deeper than either of those species (80% of lots from 550–825 m; $\bar{x}$ = 692 m; n = 33), although *G. fischeri* and *G. superba* have sometimes been collected together (Quinn, in press a). Like shells of *G. superba*, almost all shells of *G. olivacea* have a small, neat hole replacing the protoconch and leading into the umbilicus, and a narrow channel at the junction of the umbilical rim and outer lip (figure 3), both caused by a commensal polychaete worm that lived in a mud tube within the umbilicus (Quinn, in press a).

Subfamily Eucyclinae Koken, 1897
Tribe Chilodontini Wenz, 1938
Genus *Mirachelus* Woodring, 1928

Type species (original designation): *Calliostoma corbis* Dall, 1889.

Mirachelus acanthus new species
(figures 4–6)

Description: Shell small for genus, attaining 3.70 mm height, 2.95 mm width, conical, nonumbilicate, white, nacreous under thin outer porcelaneous layer. Protoconch about 325 μm maximum diameter, about one whorl. Teleoconch whorls about 5.4; first 1.5–2 whorls with strong axial lamellae, remaining strong but becoming more rounded on subsequent whorls, spaced about 0.5 mm apart on fifth whorl; very fine, oblique threads covering whorl surface; 2 spiral cords appearing near end of second whorl, abapical cord stronger and forming periphery; weak angulation or spiral cord sometimes present at suture; strong, conical tubercles at intersections of axial and spiral sculpture. Base convex, with 4–5 strong spiral cords, spiral cords undulate or weakly beaded abaxially, more distinctly beaded adaxially. Aperture oblique, ovate, thickened within, with 8–9 weak ridges on thickening; columella short, thickened, weakly inflated medially.

Type material: Holotype, DMNH 187589; 3 paratypes, DMNH 187590; 1 paratype, USNM 860246; Lightbourn-Guest *Northstar* Expedition Station 582, off Castle Harbour, Bermuda, 100 m.

Type locality: Off Castle Harbour, Bermuda, in 100 m.

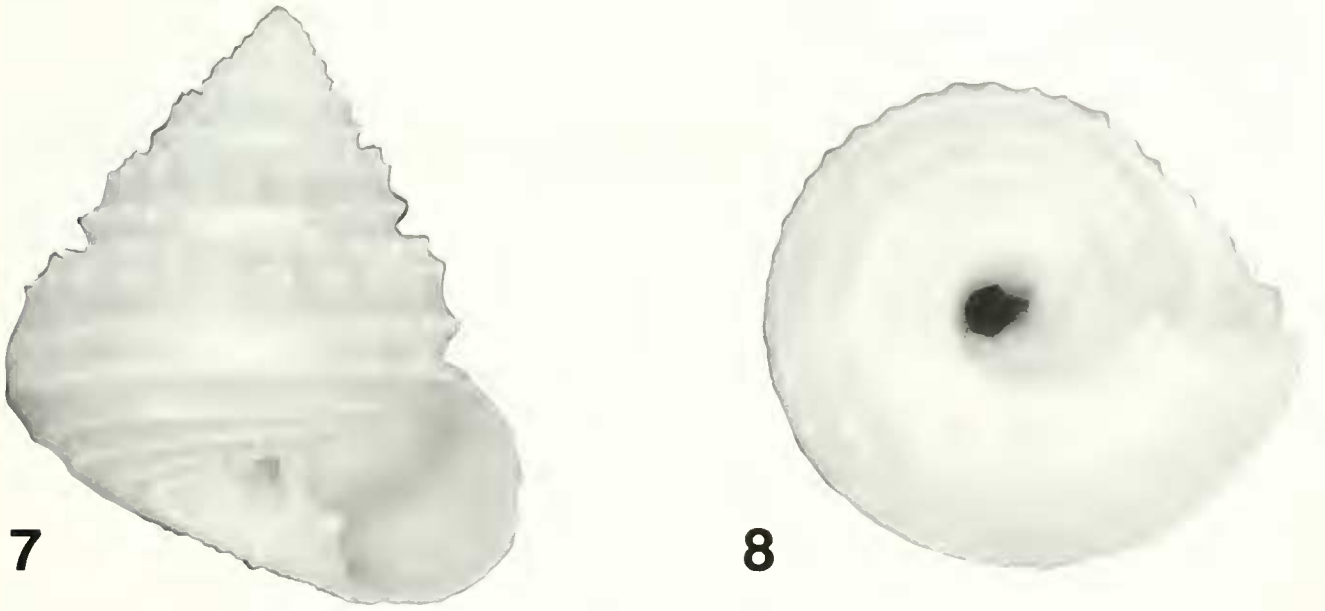
Remarks: Shells of this species are most similar to those of *Mirachelus clinocnemus* Quinn, 1979, but differ in having weaker but sharper spiral cords, the peripheral one stronger and more projecting than the one just adapical; in having the axial lamellae sharper and more widely spaced (0.5 mm apart in *M. acanthus*, 0.25 mm apart in *M. clinocnemus*); and in having more prominent, sharply conical tubercles on the peripheral and supraperipheral spiral cords. The shells of *M. acanthus* are also slightly broader than those of *M. clinocnemus*.

Tribe Calliotropini Hickman and McLean, 1990
Genus *Calliotropis* Seguenza, 1903

Type species (original designation): *Trochus ottoi* Philippi, 1844.

Calliotropis globosa new species
(figures 7, 8)

Description: Shell of medium size for genus, attaining 9.7 mm height, 8.7 mm width, turbinate with inflated whorls, umbilicate, white, nacreous under thin outer porcelaneous layer. Protoconch large, about 525–550 μm maximum diameter, 1 whorl. Teleoconch whorls 6.25; first 1.5 whorls with thin axial riblets, rapidly becoming weaker on next whorl, finally becoming restricted to subsutural area on last whorl; pair of spiral threads appearing on first whorl, one subsutural, one just below midwhorl and forming whorl periphery, both becoming slightly stronger on subsequent whorls; third spiral thread appearing on third whorl between suture and primary subsutural spiral thread, gradually becoming slightly



Figures 7, 8. *Calliotropis globosa* new species. Holotype, USNM 859419, height 9.45 mm, width 8.70 mm, from S of Jamaica, 17°21.4′N, 77°34.8′W, 805–1,089 m.

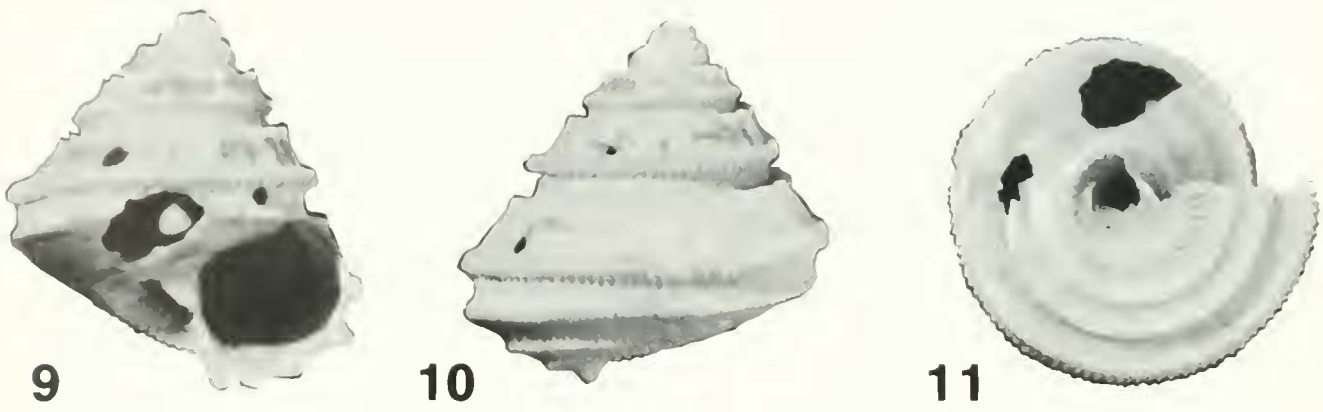
stronger than primary subsutural spiral thread on subsequent whorls; fourth spiral thread similar to peripheral thread, appearing on last whorl, coincident with suture on spire whorls. Base convex, with 4 spiral cords; outermost cord almost smooth, cords becoming progressively more strongly tuberculate adaxially; innermost 2 cords most closely spaced; transverse rugae becoming progressively stronger adaxially. Umbilicus deep, walls axially rugose and almost vertical. Aperture subovate, lips thin; columella sigmoid, thin, with rather strong, rounded tooth medially in some specimens.

Type material: Holotype, USNM 859419; 2 paratypes, USNM 859420; 2 paratypes, ANSP 383289; 2 paratypes, FSBC I 39515; 2 paratypes, UF 169956; 2 paratypes, MCZ 302452; 2 paratypes, AMNH 232160; 21 paratypes, UMML 30.8358; *John Elliott Pillsbury* Station P-1262, 17°21.4′N, 77°34.8′W, 805–1,089 m; 10-foot otter trawl; 15 July 1970.

Type locality: South of Jamaica, *John Elliott Pillsbury* Station P-1262, 17°21.4′N, 77°34.8′W, 805–1,089 m.

Other material examined: 17 specimens, UMML 30.8355; *John Elliott Pillsbury* Station P-604, 18°58′N, 87°28′W, 970–988 m; box dredge; 17 March 1968.—27 specimens, UMML 30.8356; *John Elliott Pillsbury* Station P-605; 18°50.1′N, 87°31.5′W, 695–773 m; 10-foot otter trawl; 17 March 1968.—10 specimens, UMML 30.5703; 11 specimens, UMML 30.8361; *John Elliott Pillsbury* Station P-607, 18°30′N, 87°37′W, 715–787 m; 10-foot otter trawl; 17–18 March 1968.—3 specimens, MCZ 294845; *Blake* Station XVIII, 18°20′30″N, 87°16′40″W, 1,097 m; 1880.—4 specimens, UMML 30.8360; *John Elliott Pillsbury* Station P-1255, 17°18′N, 78°32′W, 622–823 m; 10-foot otter trawl; 14 July 1970.—2 specimens, UMML 30.8359; *John Elliott Pillsbury* Station P-1261, 17°13′N, 77°50′W, 595–824 m; 10-foot otter trawl; 15 July 1970.—1 specimen, MCZ 135174; *Atlantis* Station 3454, 23°24′N, 80°36′W, 1,097 m; 4 May 1939.—4 specimens, MCZ 135175; *Atlantis* Station 3457, 23°23′N, 80°36′W, 1,006 m; 4 May 1939.—3 specimens, MCZ 135179; *Atlantis* Station 3345, 21°08′N, 79°56′30″W, 1,280 m; 8 April 1939.—3 specimens, MCZ 135177; 6 specimens, MCZ 135178; *Atlantis* Station 3366, 20°46′N, 74°59′W, 1,097 m; 19 April 1939.—5 specimens, MCZ 135183; *Atlantis* Station 3359, 20°38′N, 74°32′W, 1,829 m; 18 April 1939.—1 specimen, UMML 30.8357; *John Elliott Pillsbury* Station P-919, 16°05.3′N, 61°19.3′W, 704–732 m; 5-foot Blake trawl; 12 July 1969.—6 specimens, UMML 30.8362; *John Elliott Pillsbury* Station P-850, 11°45.5′N, 61°29.5′W, 896–923 m; 10-foot otter trawl; 3 July 1969.—9 specimens, UMML 30.7337; *John Elliott Pillsbury* Station P-846, 11°37.8′N, 60°37.4′W, 878–942 m; 10-foot otter trawl; 2 July 1969.—1 specimen, UMML 30.7347; *John Elliott Pillsbury* Station P-847, 11°37.3′N, 0°59.4′W, 920–1,244 m; 41-foot otter trawl; 2 July 1969.—13 specimens, UMML 30.6912; *John Elliott Pillsbury* Station P-754, 11°36.0′N, 68°42.0′W, 684–1,574 m; 10-foot otter trawl; 26 July 1968.

Remarks: Shells of this species are most similar to those of *Calliotropis actinophora* (Dall, 1890) in size, general shape, and sculpture but differ in being proportionately narrower; in having narrower umbilici; in having stronger, more widely spaced subsutural axial rugae; in having the adaxial two spiral rows of tubercles more closely spaced; and in having four rather than three basal spiral cords. *Calliotropis globosa* is known from the Yucatán



Figures 9–11. *Calliotropis dentata* new species. Holotype, USNM 859419, height 9.4 mm, width 9.2 mm, from off Isla Orchilla, Venezuela, 11°47.8′N, 66°06.8′W, 1,052–1,067 m.

coast near Banco Chinchorro, from Cay Sal Bank and Cuba, from south of Jamaica, and along the northern South American coast from Venezuela to Suriname, mostly in depths of about 700–1,100 m (range = 595–1,829 m).

Calliotropis dentata new species
(figures 9–11)

Description: Shell of medium size for genus, attaining at least 9.4 mm height, 9.2 mm width, conical with shouldered whorls, peripherally carinate, strongly sculptured, white, nacreous under outer porcelaneous layer. Protoconch and much of first whorl missing. First remaining whorl with narrow axial riblets and weak subsutural and peripheral spiral angulations. Second whorl largely decorticated but showing strengthening angulations. Subsutural angulation becoming spiral row of strong, conical, axially elongate tubercles rising above level of suture; peripheral angulation forming carina set with closely set, cog-like tubercles connected and crossed by fine spiral thread. Final whorl with second carina, similar to peripheral carina but slightly weaker, abapical to peripheral carina and coincident with suture line. Whorl surface between spiral carinae flat, with fine, collabral growth lines. Base convex, with 3 strong, tuberculate spiral cords; whorl surface between innermost 2 spiral cords with weak collabral rugae that generally connect tubercles of cords. Umbilicus about 30% maximum shell diameter, funnel-shaped, walls with axial rugae and single weak spiral thread. Lips of aperture and columella broken.

Type material: Holotype, USNM 859422; *John Elliott Pillsbury* Station P-741, 11°47.8′N, 66°06.8′W, 1,052–1,067 m; 40-foot otter trawl; 23 July 1968.

Type locality: Off Isla Orchilla, Venezuela, *John Elliott Pillsbury* Station P-741, 11°47.8′N, 66°06.8′W, 1,052–1,067 m.

Remarks: The shell of *Calliotropis dentata* is easily distinguished from those of all other western Atlantic *Calliotropis* by having the peripheral and subperipheral spiral cords with closely set, cog-like beads instead of conical tubercles. The shell of *C. dentata* is very similar in sculpture to that of *C. persculpta* (Sowerby, 1903) (see Kaicher, 1990: card 5695) from South Africa but differs in being higher spired and in having stronger basal spiral cords and a narrower umbilicus.

Genus *Echinogurges* Quinn, 1979

Type species (original designation): *Trochus* (*Margarita*) *clavatus* Watson, 1879.

Echinogurges tuberculatus new species
(figures 12–14)

Echinogurges rhysus: Quinn, 1979:21, 22, figs. 39, 40. [Misidentification; not *Trochus* (*Margarita*) *rhysus* Watson, 1879.]

Description: Shell small, attaining 4.6 mm height, 3.9 mm width, conical with shouldered whorls, strongly sculptured, umbilicate, white, nacreous under thin outer porcelaneous layer. Protoconch about 375 μm maximum diameter, bulbous, 1 whorl. Teleoconch whorls 5.5, tubular, carinate, first whorl with strong, thin axial riblets that become weak collabral ridges on subsequent whorls; pair of spiral ridges appearing on second whorl, one subsutural, one at midwhorl forming carinate whorl periphery; third tuberculate spiral ridge present on body whorl, coincident with suture on spire whorls; strong, conical tubercles at intersections of axial and spiral sculpture. Base convex, rounding into umbilicus, with 4 smoothish to finely tuberculate spiral cords. Umbilicus narrow, pore-like, wall with axial rugae. Aperture subcircular, lips thin, inner lip weakly reflected into umbilicus; columella concave, thin, rounding smoothly into outer lip.

Type material: Holotype, USNM 330606; 4 paratypes, USNM 859426; *Albatross* Station 2654, 27°57′30″N, 77°27′30″W, 1,207 m; large beam trawl; 2 May 1886.—13 paratypes, MCZ 302536; *Atlantis* Station 2993,

Figures 12–14. *Echinogurges tuberculatus* new species. **12. 13.** Paratype, UMML 30.8095, height 4.0 mm, width 3.1 mm, from southern Straits of Florida, *Gerda* Station G-1106, 24°02′N, 81°30′W, 1,706–1,723 m. **14.** Protoconch of paratype (USNM 859426) from NE of Little Bahama Bank, *Albatross* Station 2654, 27°57′30″N, 77°27′30″W, 1,207 m, 97 ×.

33°19′N, 80°44′W, 1,061 m; 15 March 1938.—4 paratypes, USNM 859426; *Albatross* Station 2415, 30°44′N, 79°26′W, 805 m; large beam trawl; 1 April 1885.—2 paratypes, UMML 30.8054; *Gerda* Station G-368, 24°03′N, 81°10′W, 961–1,016 m; 16-foot otter trawl; 15 September 1964.—1 paratype, UMML 30.8041; *Gerda* Station G-130, 23°59′N, 81°10′W, 1,021 m; 10-foot otter trawl; 21 June 1963.—1 paratype, UMML 30.8163; *Gerda* Station G-859, 23°54′N, 81°57′W, 1,161–1,200 m; 10-foot otter trawl; 29 August 1967.—2 paratypes, USNM 438284; 10 miles N of Cuba, 1,427 m; J. B. Henderson coll.—2 paratypes, MCZ 7584; *Blake* Station, Yucatan Channel, 1,171 m.

Type locality: Northeast of Little Bahama Bank, *Albatross* Station 2654, 27°57′30″N, 77°27′30″W, 1,207 m.

Other material examined: 1 specimen, UMML 30.8095; *Gerda* Station G-1106, 24°02′N, 81°30′W, 1,706–1,723 m; 10-foot otter trawl; 29 April 1969.—4 specimens, MCZ 135026; *Atlantis* Station 2988, 23°15′N, 79°57′W, 695 m; 14 March 1938.

Remarks: Shells of *Echinogurges tuberculatus* are most similar to those of *E. clavatus* (Watson, 1879) but differ in having only a single peripheral spiral ridge; weaker, more widely spaced axial sculpture; and fewer basal spiral cords. Specimens of *E. tuberculatus* were misidentified as *E. rhysus* (Watson, 1879) by Quinn (1979). Subsequent examination of the types of *Trochus* (*Margarita*) *rhysus* Watson, 1879, revealed that *T.* (*M.*) *rhysus* is actually a species of *Calliotropis* Seguenza, 1903 (Quinn, in press a). *Echinogurges tuberculatus* is known only from off the east coast of Florida, the Bahama Islands, and the Straits of Florida in depths of 805–1,723 m.

ACKNOWLEDGMENTS

I thank the late Gilbert L. Voss (Rosenstiel School of Marine and Atmospheric Science, University of Miami) for access to the collections under his care and for permission to describe the new species in that material. Richard S. Houbrick and the late Joseph Rosewater (both USNM), and Rüdiger Bieler (formerly DMNH) kindly allowed me to examine types and other material. Russell Jensen (DMNH) brought the Bermuda specimens to my attention. Marjorie Myers, Llyn French, and Judy Leiby provided valuable word-processing and editorial assistance. Thomas H. Perkins and William G. Lyons (both Florida Marine Research Institute, Department of Natural Resources), and two anonymous reviewers provided valuable critiques of previous drafts of this paper.

LITERATURE CITED

Dall, W. H. 1881. Reports on the results of dredging, under the supervision of Alexander Agassiz, in the Gulf of Mexico, and in the Caribbean Sea, 1877–79, by the United States Coast Survey steamer "Blake," Lieutenant-Commander C. D. Sigsbee, U.S.N., and Commander J. R. Bartlett, U.S.N., commanding. XV. Preliminary report on the Mollusca. Bulletin of the Museum of Comparative Zoology, Harvard University 9(2):33–144.

Dall, W. H. 1889. Reports on the results of dredging, under the supervision of Alexander Agassiz, in the Gulf of Mexico (1877–78) and in the Caribbean Sea (1879–80), by the U. S. Coast Survey steamer "Blake", Lieut.-Commander C. D. Sigsbee, U.S.N., and Commander J. R. Bartlett, U.S.N., commanding. XXIX. Report on the Mollusca. Part 2. Gastropoda and Scaphopoda. Bulletin of the Museum of Comparative Zoology, Harvard University 18:1–492.

Dall, W. H. 1890. Scientific results of explorations by the U. S. Fish Commission steamer "Albatross". VII. Preliminary report on the collection of Mollusca and Brachiopoda obtained in 1887–88. Proceedings of the United States National Museum 12(773):219–362.

Hickman, C. S. and J. H. McLean. 1990. Systematic revision and suprageneric classification of trochacean gastropods. Natural History Museum of Los Angeles County, Science Series, No. 35, vi + 169 p.

Kaicher, S. D. 1990. Card catalogue of world-wide shells. Pack #56—Trochidae V. Privately published, St. Petersburg, FL.

Okutani, T. 1983. Mollusks. *In:* Takeida, M. and T. Okutani. Crustaceans and mollusks trawled off Suriname and French Guiana. Japan Marine Fishery Resource Research Center, Tokyo, p. 187–354.

Philippi, R. A. 1844. Enumeratio molluscorum Siciliae cum viventium tum tellure tertiaria fossilium, quae in itinere suo observavit, Vol. 2. Halis Saxonum, iv + 303 p.

Quinn, J. F., Jr. 1979. Biological results of the University of Miami deep-sea expeditions. 130. The systematics and zoogeography of the gastropod family Trochidae collected in the Straits of Florida and its approaches. Malacologia 19(1):1–62.

Quinn, J. F., Jr. 1991. *Lamellitrochus*, a new genus of Solariellinae (Gastropoda: Trochidae), with descriptions of six new species from the western Atlantic Ocean. The Nautilus 105(3):81–91.

Quinn, J. F., Jr. In press a. The Trochidae of the Gulf of Mexico (Prosobranchia: Archaeogastropoda). Memoirs of the Hourglass Cruises.

Quinn, J. F., Jr. In press b. New species of *Solariella* (Gastropoda: Trochidae) from the western Atlantic Ocean. The Nautilus.

Seguenza, G. 1903. Molluschi poco noti dei terreni terziarii di Messina. Societa Geologica Italiana, Bolletino 21:455–464.

Sowerby, G. B., III. 1903. Mollusca of South Africa. Marine Investigations in South Africa 2:213–232.

Watson, R. B. 1879. Mollusca of H.M.S. *Challenger* Expedition. III. Trochidae, viz. the genera *Seguenzia*, *Basilissa*, *Gaza*, and *Bembix*. Journal of the Linnean Society of London, Zoology 14:586–605.

Woodring, W. P. 1928. Miocene mollusks from Bowden, Jamaica, II. Gastropods. Carnegie Institution of Washington, Publication 385:1–564.